

الف) $y = x^2 - 2x + 1$ و $x(x^2 - 2x + 1)$

ب) $y = \frac{1}{x^2 - 2x}$ $\Rightarrow y(x^2 - 2x) = 1 \Rightarrow x^2 - 2x = \frac{1}{y} = x(x - 2) = \frac{1}{y}$
 $R_f = \mathbb{R} - \{0\}$

الف) $\text{ext} \mid \frac{b}{a} \Rightarrow R_f = [0, +\infty)$

ب) $\text{ext} \mid \frac{1}{x} \Rightarrow R_f = \mathbb{R} \setminus \{0\}$

ج) $\text{ext} \mid \frac{1}{x^2} \Rightarrow R_f = [0, +\infty)$

د) $\text{ext} \mid \frac{1}{x^3} \Rightarrow R_f = [0, +\infty)$

الف) $\text{ext} \mid \frac{1}{x} \Rightarrow R_f = \mathbb{R}$

ب) $\text{ext} \mid \frac{1}{x^2} \Rightarrow R_f = \mathbb{R}$

ج) $\text{ext} \mid \frac{1}{x^3} \Rightarrow R_f = [0, +\infty)$

د) $\text{ext} \mid \frac{1}{x^4} \Rightarrow R_f = [0, +\infty)$

الف) $y = \frac{x^2 + 1}{x - 2}$ و $x \neq 2, x \neq 0 \Rightarrow R_f = \mathbb{R} - \{2\} \Rightarrow R_f = \mathbb{R} - \{2\}$

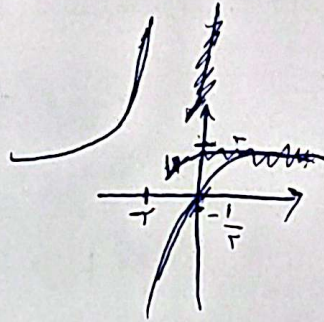
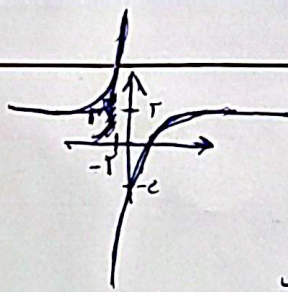
ب) $y = \frac{x^2 + 1}{x + 1} \Rightarrow R_f = \mathbb{R} - \{-1\}$

الف) $y = \sqrt{\frac{x^2 + 4}{x + 1}} \Rightarrow R_f = [0, +\infty) - \{-1\}$

برای این تابع باید به هر دو طرف توان ۲ را بگیریم و به دست آوریم

ب) $y = \sqrt{\frac{x^2 + 1}{x - 2}} \Rightarrow \sqrt{\frac{x^2 + 1}{x - 2}} \Rightarrow R_f = [0, +\infty)$

الف) $\frac{2x^3}{2x+1}$



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ب) $\frac{2x^3-1}{2x+1}$

الف) $y = 2x + \frac{1}{2x}$ $\Rightarrow R_f = [x, 2]$

ب) $y = \frac{x^2-1}{x^2} = x^2 + \frac{1}{x^2} \Rightarrow R_f = (-\infty, -1] \cup [1, +\infty)$

ج) $y = \frac{\sqrt{x^2+1}}{\sqrt{x}}$

د) $y = \sqrt{x} + \frac{1}{\sqrt{x}} \Rightarrow R_f = [1, +\infty)$

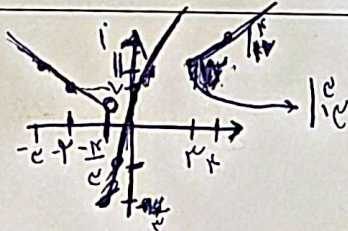
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الف) $y = x^2 + \frac{1}{x^2+c}$ ~~$\Rightarrow R_f = [c, +\infty)$~~ $\Rightarrow 0 + \frac{1}{c} = x^2 + \frac{1}{x^2+c} \Rightarrow x^2 = \frac{1}{c} - \frac{1}{x^2+c} \Rightarrow x^2 = \frac{1}{c} - \frac{1}{x^2+c}$ ~~$\Rightarrow R_f = [c, +\infty)$~~

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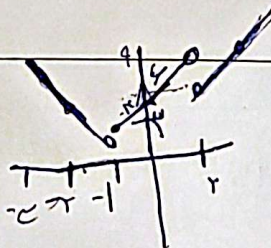
ب) $y = \frac{x^2+5}{\sqrt{x^2+c}} \Rightarrow \frac{t^2-1+c+5}{t} = \frac{t^2-1}{t} = \frac{(t-1)(t+1)}{t} \cdot t + \frac{1}{t} \Rightarrow t + \frac{1}{t} \geq \frac{5}{t} \Rightarrow t + \frac{1}{t} \geq \frac{5}{t} \Rightarrow \frac{t^2+1}{t} \geq \frac{5}{t} \Rightarrow t^2+1 \geq 5 \Rightarrow t^2 \geq 4 \Rightarrow t \geq 2 \text{ or } t \leq -2$

$-2x-1 \leq 2x+1 \leq 2x+1$



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الف) $\frac{-1}{-2x-1} + \frac{2}{2x+1} + \frac{2}{2x}$



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